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BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

FOREST INSECT INVESTIGATIONS

FOREST INSECT SURVEY - LASSEN NATIONAL FOREST

Season of 1938

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R. C. Hall
Berkeley, California
February 13, 1939

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Forest Insect Laboratory
Berkeley, California
February 13, 1939

FOREST INSECT SURVEY - LASSEN NATIONAL FOREST

Season of 1938

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FOREST INSECT SURVEY - LASSEN NATIONAL FOREST

Season of 1938

INTRODUCTION

The annual forest insect survey for the Lassen National Forest was conducted by members of the Forest Insect Laboratory during the period of September 19 to October 13,1938. The field survey was under the direction of H. C. Hall, assisted by W. D. Hagenstein and C. S. Badman. This survey consisted of a 100 percent cruise on 5,760 acres, comprising 12 virgin and 6 cutover permanent sample plots of 320 acres each. The distribution of these plots is shown on the enclosed map, Figure 1.

SURVEY PROCEDURE

The method employed in 1938 was standard survey procedure for the California region. Losses in species other than pine were cruised, and records were taken for all windfall loss.

CHARACTER OF THE 1938 INFESTATION

The indications are that the 1938 loss due to insects in the Lassen will be approximately that recorded for 1937. While there has been a marked tendency for grouping in the Shasta and Modoc, this tendency has not been apparent in the Lassen except in a few areas. There has been a slight increase in the percentage of volume infested by the western pine beetle and a marked decrease in activity by the flathead borer and the mountain pine beetle. Previously topkilled trees constituted over half of the total volume loss for 1938.

BASIS FOR 1938 ESTIMATE

Only partial loss records are available for 1938 due to the fact that many of the 1938 winter generation trees had not started to fade at the time of the fall cruise. It is necessary each year to make an adjustment for this condition in order to arrive at an estimate of the total loss figure for the year. It was assumed that approximately 60 percent of the 1938 total volume was cruised during the past fall and the 1938 estimated figures are based upon that assumption.

INSECT CAUSED LOSSES IN PINE

Table 1 offers a comparison of insect caused losses on 12 virgin Lassen plots. These data are presented by individual plots on both a per section and per acre basis, together with the ratio of the current loss to that of the preceding year. It may be noted that there has been a gradual reduction in loss from 1935 to 1937 with 1938 being approximately the same as 1937. These two years represent the lowest point in insect losses reached since the peak in 1934. The average volume loss per acre in 1936 was 113 board feet, compared with 69 board feet for 1937 and 1938.

INSECT CAUSED LOSSES IN OTHER SPECIES

In 1937 the practice of cruising losses due to insects, in species other than pine, was initiated and continued in 1938. Table 2 summarizes the losses in other species for these two years on a per section basis. It may be noted that white fir makes up the bulk of this loss.

COMPOSITION OF THE INFESTATION

A comparison of the percentage of volume infested by different insect species is shown in table 3, where it may be noted that there has been a slight increase in western pine beetle infestation in 1938, an appreciable decrease in mountain pine beetle infestation and flathead activity and an increase in mixed broods. These percentages are based upon an examination of the lower portion of the tree trunk which could be reached from the ground. This basal examination does not in every case give a true picture of the causal organism, but it does serve as a useful index in years where the western pine beetle is the principal agent of destruction.

LOSSES OTHER THAN INSECT CAUSED

Windfall contributed a considerable amount of volume to the total loss figure on certain plots as may be noted in table 4. This ranged from over 28 percent on Lassen 5 to nothing on Lassen 12 and 13, with an average for all plots of 10 percent of the total 1938 drain. Although no records are available for past years, personal experience indicates that the windfall loss for 1938 would considerably exceed that of other years.

TABLE I. Plot Losses - Lassen National Forest

Plot	1936 Per Section No. Trees	1936 Per Section Volume B.M.	1936 Per A. Volume B.M.	Ratio 36/35	1937 Per Section No. Trees	1937 Per Section Volume B.M.	1937 Per A. Volume B.M.	Ratio 37/36	1938 Estimated Per Section No. Trees	1938 Estimated Per Section Volume B.M.	1938 Estimated Per A. Volume B.M.	Ratio 38/37
L-1	60	70,540	110	.4	52	37,760	59	.5	172	90,880	142	2.4
L-3	70	73,080	114	.5	62	104,960	164	1.4	76	67,200	105	.6
L-5	72	87,200	136	.8	36	35,840	56	.4	17	28,160	44	.8
L-6	72	41,100	64	1.2	20	25,600	40	.6	23	16,000	25	.6
L-7	18	11,900	18	.2	28	37,760	59	3.3	27	53,760	84	1.4
L-8	130	112,720	176	.4	42	42,880	67	.4	33	67,200	105	2.2
L-9	86	89,360	140	.6	44	52,480	82	.6	13	23,680	37	.3
L-10	104	59,080	92	.6	48	37,760	59	.6	43	56,960	89	1.5
L-11	56	111,860	175	1.3	54	70,400	110	.6	20	39,680	62	.6
L-12	26	53,500	84	1.1	10	28,160	44	.5	23	45,440	71	1.6
L-13	60	74,320	116	1.1	40	42,880	67	.6	20	22,400	35	.5
L-14	108	99,300	155	.4	26	37,760	59	.4	37	28,160	44	.7
Aver.	72	72,000	113	.6	38	44,160	69	.6	42	44,160	69	1.0

TABLE II

Cruised Insect Losses Other Than Pine

Per Section Basis

Plot		White Fir		Incense Cedar	
		1937	1938	1937	1938
L-5	No.	92	15		
	Vol. B.M.	119,220	66,700		
L-6	No.				6
	Vol. B.M.				1,560
L-8	No.	22	10		
	Vol. B.M.	17,420	14,220		
L-9	No.	18			
	Vol. B.M.	13,280			
L-10	No.	14	13		
	Vol. B.M.	8,300	8,520		
L-11	No.		4		
	Vol. B.M.		9,570		
L-14	No	234	7		16
	Vol. B.M.	123,920	7,047		5,760
Ave.	No.	54	7		3
	Vol. B.M.	40,310	15,150		1,050

TABLE III

Composition of Infestation, 1937 & 1938
from Basal Examination

Insect Species	Percent of Volume Killed 1937	1938
Dendroctonus brevicomis	54	59
Dendroctonus monticolae	25	15
Dendroctonus valens	7	9
Flathead	12	.1
Mixture	2	16
Unknown	0	2

TABLE IV

Windfall Loss in Pine 1938 - Lassen

Plot No.	Volume B.M. per Acre	Percent of Total Drain
L-1	14	14.0
L-3	11	17.8
L-5	9	28.2
L-6	0	.0
L-7	3	5.9
L-8	1	.3
L-9	1	2.7
L-10	4	7.6
L-11	7	14.2
L-12	0	.0
L-13	0	.0
L-14	7	24.9
Average	5	10.7

EFFECT OF TOPKILLED TREES.

The effect of previously topkilled trees in the 1938 loss was quite marked where this one class of decadent tree alone made up approximately 60 percent of the total insect caused loss for the Lassen, Table 5. It is considered that this class of material will continue to be of importance in future losses.

LOSSES ON CUTOVER AREAS.

Insect caused losses on cutover areas are presented for 1937 and 1938, by species, in Table 6. These are presented by number of trees and volume on a per section basis. In table 7, a comparison is made between increment and depletion. It may be noted that the average balance on cutover areas at the present time is very favorable in that increment is 30 times as great as loss in 1938.

LOSSES BY INFESTATION UNITS.

Table 8 and figure 2 offer a comparison of insect caused losses by different units for the years 1936, 1937 and 1938. As the existing sample plots do not uniformly sample all units, these figures are considered as being only approximate.

INSECT LOSSES BY HAZARDS

The Forest Insect Laboratory has recently completed an insect hazard zonation in the Eastern Lassen, (Johnson, 1938)* covering the territory partially sampled by permanent sample plots. An estimate of losses, based on permanent sample plots, in 1937 and 1938, in units covered by the hazard report, shows a close correlation between hazard and loss for these two years (Table 9). In 1937, Hazard III had an average loss of .34 percent of the residual stand ~~loss~~, Hazard IV averaged .60 percent and Hazard V averaged 1.34 percent. In 1938, Hazard III averaged .41 percent, Hazard IV averaged .63 percent and Hazard V averaged 1.49 percent. Figure 1. It is recognized, of course, that two years records of losses does not offer conclusive evidence of the correlation between hazard and loss, and it will be necessary to acquire further records on this and other areas before definite conclusions can be drawn.

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*Johnson, P. C. 1938. Forest Insect Hazard Inventory, Project Report: Eastern Lassen Area.

TABLE V

Volume Loss Made Up of Old Topkilled Trees
on the Lassen Virgin Plots. 1938.

Plot Number	Volume, B.M. per acre	Percent of Total Insect Loss
L-1	53	37.6
L-3	50	47.4
L-5	27	60.2
L-6	9	35.6
L-7	51	60.7
L-8	73	69.6
L-9	19	52.7
L-10	78	87.3
L-11	51	82.5
L-12	57	80.0
L-13	12	33.7
L-14	21	48.8
Average	41	58.9

TABLE VI

Losses on Cutover Areas
Per Section

Plot Number	Species	1937 No.	1937 Vol. B.M.	1938 estimated No.	1938 estimated Vol.B.M.
CO-6	Ponderosa pine	6	2,140	6	2,460
	Jeffrey pine	2	140		
	White fir	4	540		
	TOTAL	12	2,820	6	2,460
CO-7	Ponderosa pine	2	80	6	670
	White fir	26	5,600	6	670
	TOTAL	28	5,680	12	1,340
CO-8	Ponderosa pine				
	White fir	20	5,440	14	4,780
	TOTAL	20	5,440	14	4,780
CO-9	Ponderosa pine				
	Jeffrey pine	2	940		
	White fir	34	7,220	23	9,650
	Red fir	2	700	3	1,900
	TOTAL	38	8,860	26	11,550
CO-10	Ponderosa pine	2	820		
	Jeffrey pine	2	2,140	6	4,400
	TOTAL	4	2,960	6	4,400
CO-25	Ponderosa pine	2	900		
	Jeffrey pine	6	1,020	6	1,200
	TOTAL	8	1,920	6	1,200

TABLE VII

Lassen Cutover Plots
Residual Stand, Increment and Insect Loss in Pine,
Season of 1938

Plot Number	Volume B. M. Residual Stand per acre	Average Growth per acre per year	Loss per acre 1938
CO-6	2,736	45	2
CO-7	1,312	128	1
CO-8	3,065	32	0
CO-9	3,875	70	0
CO-10	6,156	107	7
CO-25	No stand or growth data		2
Average	3,425	76	2

Increment - Average annual growth percent of residual stand	2.2
Depletion - Insect loss, percent of residual stand, 1938	.06
Depletion-Increment ratio	.03

TABLE VIII

Unit Losses - Lassen National Forest

Unit	Virgin timbered acreage	1936		1937		1938	
		No. trees	Volume M.B.M.	No. trees	Volume M.B.M.	No. trees	Volume M.B.M.
Bogard Buttes	25,200	2,270	3,530	1,410	1,660	550	1,060
Stephens Ranch	27,760	1,880	2,280	780	940	360	720
Butte Creek	27,260	1,340	2,750	190	1,450	1,170	2,320
Hall's Flat	11,320	530	620	450	340	1,470	800
Nigger Spring	14,830	2,150	1,230	590	770	680	490
Beaver Creek	28,380	4,480	4,630	1,730	2,160	1,500	1,330
Black's Mountain	30,250	3,390	3,990	2,930	2,150	9,440	5,140
Crater Mountain	14,100	1,270	1,540	790	790	370	620
Harvey Valley	22,130	2,700	2,810	1,840	2,720	1,550	1,570
Straylor Lake	28,660	6,430	5,730	1,780	2,180	1,890	1,380
Gordon Valley	34,320	4,300	3,330	1,850	2,160	1,610	3,230
Cave Mountain	17,460	1,980	1,150	1,340	1,340	1,260	1,960
Logan Mountain	2,060	200	180	90	130	80	130
Coble Mountain	21,510	2,880	2,520	1,290	1,510	770	840
Brockman Flat	10,590	1,710	970	950	750	850	1,130
Total	315,830	37,510	37,260	18,010	21,050	23,550	22,720

Units without estimates	
Cambell Butte	10,880
Merril Flat	25,060
Dixie Valley	17,450

TABLE IX

Insect Loss on Different Hazard Areas
Lassen - 1937 and 1938

Hazard	Unit	Percent volume loss of residual stand 1937	1938	1937 & 1938
III	Stephens Ranch	.23	.17	.40
III	Logan Mountain	.33	.33	.66
III	Bogard Butte	.41	.26	.67
III	Butte Creek	.36	.56	.92
III	Halls Flat	.36	.86	1.22
III	Crater Mountain	.35	.27	.62
Average		.34	.41	.75
IV	Black's Mountain	.45	1.08	1.53
III & IV	Harvey Valley	.88	.57	1.45
III & IV	Gordon Valley	.48	.72	1.20
III & IV	Straylor Lake	.73	.46	1.19
IV	Nigger Spring	.48	.31	.79
Average		.60	.63	1.23
V	Coble Mountain	1.23	.68	1.91
V	Brockman Flat	2.54	3.82	6.36
V & IV	Beaver Creek	.90	.47	1.37
V & IV	Cave Mountain	.68	.98	1.66
Average		1.34	1.49	2.83

Figure 1.

~~Figure X~~

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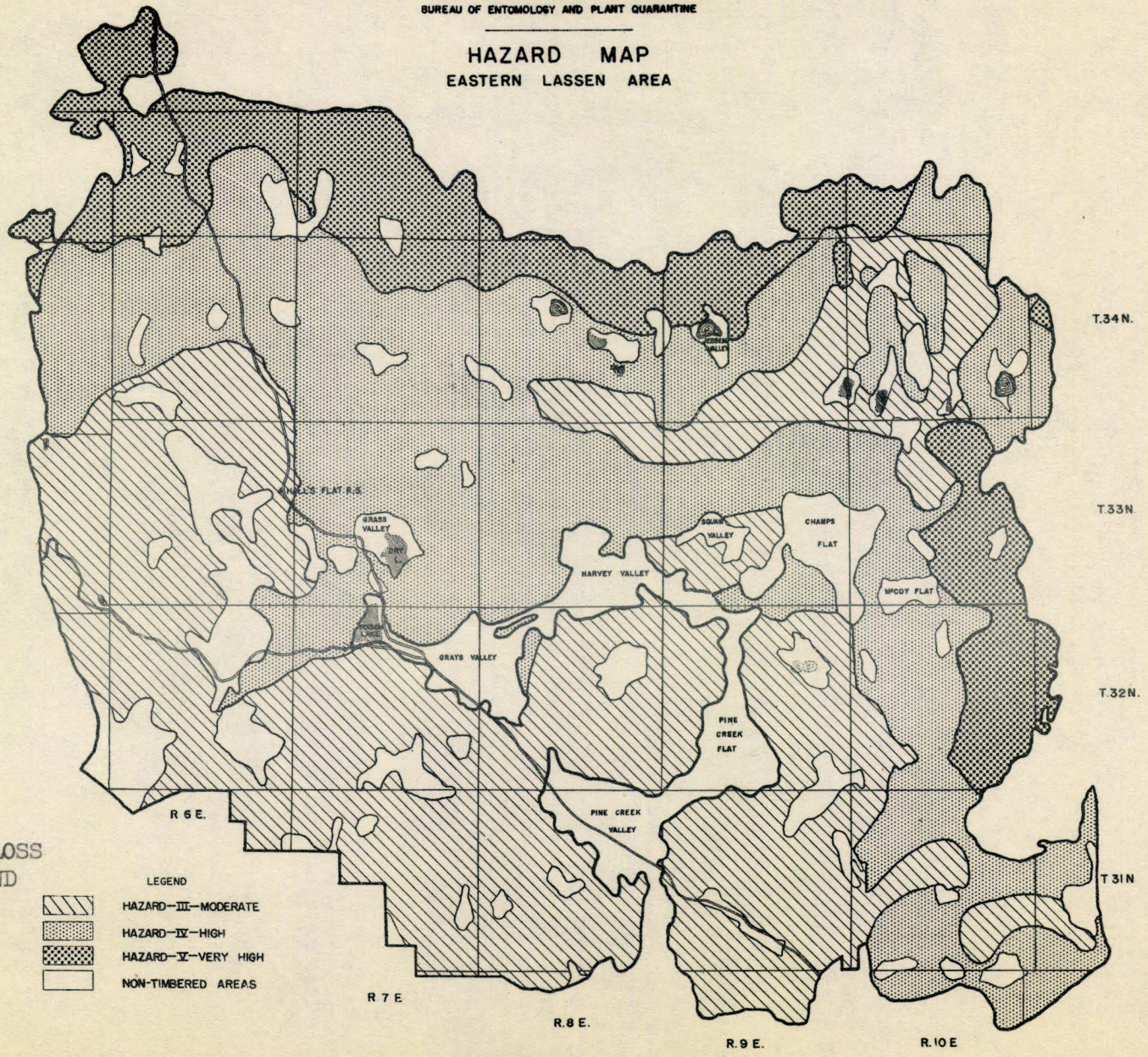
HAZARD MAP
EASTERN LASSEN AREA



1937-1938 LOSS
% OF STAND
.75
1.23
2.83

LEGEND
HAZARD—III—MODERATE
HAZARD—IV—HIGH
HAZARD—V—VERY HIGH
NON-TIMBERED AREAS

SUMMARY AND RECOMMENDATIONS

Insect caused losses on the Lassen for 1938 are expected to be approximately the same as recorded for 1937, and should average about 70 board feet per acre. These two years represent the lowest point in the past loss cycle which reached a peak in 1934 with an average of 335 board feet per acre. The proportion of volume infested by the western pine beetle remains about the same as the previous year, with a decline in activity by the California flathead and the mountain pine beetle.

The losses in both 1937 and 1938 have shown a close correlation with insect hazard areas as zoned during the preceding season, with the losses being the least on areas of low hazard.

Control is not considered advisable for the Lassen for the 1938 winter generation trees. However, it is expected that a cutting operation which would remove all topkilled and other equally decadent trees would materially reduce subsequent losses due to insects. Old topkilled trees alone made up about 60 percent of the insect caused loss in 1938.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

REGIONAL SURVEYS

EASTERN LASSEN AREA, CALIFORNIA

UNIT BOUNDARY
SAMPLE PLOT; VIRGIN STAND
SAMPLE PLOT; CUTOVER STAND
CUTOVER LAND

J. H. FISKE

MODOC
N. F.
COBLE MT.
BEAVER CREEK
NIGGER SPRING
DIXIE VALLEY
STRAYLOR LAKE
GORDON VALLEY
HALLS FLAT
BUTTE CREEK
BLACKS MT.
HARVEY VALLEY
CRATER MT.
LOGAN MT.
CAVE MT.
EAGLE LAKE
BROCKMAN FLAT
BOGARD BUTTES
STEPHENS RANCH
CAMPBELL BUTTE
MERRILL FLAT
LASSEN VOLCANIC NAT. PARK
PRIMITIVE AREA
GAME REFUGE
L-1
L-2
L-3
L-5
L-6
L-7
L-8
L-9
L-10
L-11
L-12
L-13
L-14
CO-6
CO-7
CO-8
CO-9
CO-10
CO-25
T.35N.
T.34N.
T.33N.
T.32N.
T.31N.
T.30N.